ABSTRACT

METHOD AND APPARATUS FOR IMAGING AN OBJECT AND A DELIVERING DEVICE FOR LOW COHERENCE OPTICAL RADIATION

The invention relates to studies of internal structures of objects with the aid of optical means. According to the invention an optical system (15) of the delivering device for low coherence optical radiation, in a particular embodiment, an optical fiber probe (8), includes at least two lens components (19), (20), which have a positive focal power and are positioned substantionally confocally. This ensures a constant propagation time for the low coherence optical radiation propagating from a given point of the transverse scanning surface (28) or (39) to a corresponding conjugate point of the image plane (22). That provides elimination of the transverse scanning related aberration of the optical path length for low coherence optical radiation directed towards the object (11) both for a flat transverse scanning surface (28) and for a transverse scanning surface (39) having a curvature. In another embodiment, together with the substantionally confocal arrangement of lens components (19), (20), the longitudinal scanning is performed by varying the optical path length for the low coherence optical radiation propagating from the transverse scanning surface (28) to the optical system (15), i.e., from the end face (17) of the distal part (18) of the optical fiber (14) to the optical system (15). To achieve this, a device for longitudinal scanning (10) is incorporated into the optical fiber probe (8). This ensures a corresponding shift of the focusing position of the low coherence optical radiation during longitudinal scanning, i.e., allows for alignment of the focusing position of the low coherence optical radiation with the position of the coherence gate and, consequently, their simultaneous movement.

(12) МЕЖДУНАРОДНАЯ ЗАЯВКА, ОПУБЛИКОВАННАЯ В СООТВЕТСТВИИ С ДОГОВОРОМ О ПАТЕНТНОЙ КООПЕРАЦИИ (PCT)

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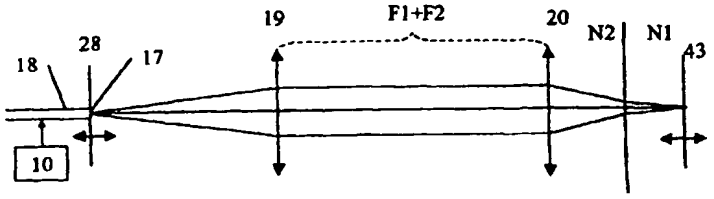

(57) Abstract: The invention relates to the study of the internal structure of objects with the aid of optical means. The inventive optical system for a device for delivering low coherent optical radiation is embodied in the form of at least two lens components (19, 20) which are arranged approximately confocally and have a positive optical power, thereby ensuring the constancy of the travel time of the radiation from a set point on a surface (28) of a transverse scanning to a corresponding conjugate point on an image plane. The structure of the system also ensures the correction of the aberration of the optical path of the radiation which is directed towards a studied object, said aberration being associated with a transverse scanning irrespective the surface (28) thereof is flat or curved. In another embodiment of the system, wherein the components (19, 20) are arranged confocally, the longitudinal scanning is carried out by modifying the optical path of the radiation from the surface (28) to the optical system, i.e. from the end surface (17) of the distal section of an optical fibre to the optical system. For this purpose, a device (10) for longitudinal scanning is arranged inside an optofibre probe, thereby making it possible to offset accordingly the radiation focusing point during the longitudinal scanning of the studied object, i.e. make it possible to superpose the position of the radiation focusing point with the position of a coherence window, and therefore simultaneously displace them.

[Продолжение на след. странице]

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